

Notice of Allowability

Application No.

10/656,710

Examiner

Alan Diamond

Applicant(s)

MOOK, WILLIAM H.

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Interview Summaries that occurred on 2/21/06 and 2/22/06.
2. ☒ The allowed claim(s) is/are 1-6,9,11-13,16-28,31-38 and 40-45.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 04042005
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 02212006.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Alan Diamond
Primary Examiner
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EXAMINER'S AMENDMENT

1. An extension of time under 37 CFR 1.136(a) is required in order to make an examiner's amendment which places this application in condition for allowance. During a telephone conversation conducted on February 21, 2006, Mr. Gerald Smith requested an extension of time for THREE MONTH(S) and authorized the Director to charge Deposit Account No. 13-4830 the required fee of \$510 for this extension and authorized the following examiner's amendment. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Please note that the Amendment filed 12/05/2005 is hereby entered into the instant application. The amendments to the claims set forth below are with respect to the claims in said Amendment filed 12/05/2005.

In The Claims

In claim 1, at line 15, please delete "path" and insert in its place --path, prior to the light impinging on said receiving surface,--.

In claim 12, at line 2, after "concentrator" please insert --has a--.

In claim 12, at line 2, after "surface" please insert --which--.

In claim 13, at line 2, after "concentrator" please insert --has a--.

In claim 13, at line 2, after "surface" please insert --which--.

In claim 22, at line 7, after "imaging" please insert --primary--.

In claim 22, at line 19, please delete "path" and insert in its place --path, prior to the light impinging on said receiving surface,--.

Please cancel claim 60.

2. The following is an examiner's statement of reasons for allowance: Some of the closest prior art includes Chen (U.S. Patent 6,717,045) and House et al (U.S. Patent 4,082,570). Chen '045 teaches a concentrating system that has a Fresnel lens (12) (i.e., instant primary imaging concentrator) a compound parabolic (mirror) concentrator (14) (i.e., instant secondary concentrator), and a solar cell that can be tandem, i.e., it can have a multijunction (see Figure 1b; and col. 2, lines 27-28). Chen '045 does not teach removing components of solar energy, at the concentration light path prior to the light impinging on the receiving surface (of the photovoltaic cell), corresponding with at least a portion of those wavelengths above the bandgap energy wavelength. Chen '045's concentrator (45) is a glass mirror with a silver-reflective coating (col. 2, lines 40-41), but is not taught or suggested as being capable of removing any particular components of sunlight. To the contrary, Chen '045 leads a skilled artisan to even further concentration of the light using optical concentrator (20) (see Figures 1b and 1c), and actually uses an anti-reflective, not a reflective coating on its concentrator (20) (see col. 3, lines 16-17). There is no motivation to further include in Chen '045 an optical component that removes light. Chen '045's system works fine as is, and removal of light would defeat Chen '045's teaching of concentrating a maximum amount of sunlight (see col. 2, lines 13-26 and 63-67). Even further remote from Chen '045 is Chen '551 (U.S. Patent 6,653,551) which uses an additional Fresnel lens (11).

Chen '320 (U.S. Patent 6,384,320) uses a Fresnel lens (12) and a compound parabolic concentrator (CPC) (14). The CPC allows 98% of the reflected rays to be incident on the bottom of the CPC because of high mirror quality (see col. 1, lines 34-45). Chen '320 does not teach or suggest removal of wavelengths of light above the bandgap energy, as here claimed. Rather, in Chen '320 a skilled artisan would expect that the 2% of reflected sunlight that is not incident on the bottom of the CPC would correspond to light that is either undesirably reflected out of the concentrator through the top entrance, or light that is dissipated as heat in the CPC. The light dissipated as heat could be of practically any wavelength, depending on the reflective material, protective materials over the reflective material, and their respective thicknesses and refractive indices. Chen '320 exemplifies silver, aluminum, or chrome-coated metal as the reflective material, wherein the reflective material is covered with "several layers of protective coating" (see col. 2, lines 9-20). No particular solar cell semiconductor material is mentioned in Chen '320, and as noted above, there is nothing that would lead a skilled artisan to remove components of solar energy from the concentration light path corresponding with at least a portion of those wavelengths above the bandgap energy wavelength of the solar cell. The Chen '045 (col. 2, line 28) and Chen '551 (col. 3, line 2) patents teach GaInP/GaInAs (multijunction) or GaAs (single junction) solar cells. Depending on the absorptivity and reflectivity of said "protective coatings", in combination with the reflectivity and absorptivity of the reflective material, there is no way to assume, with good reason, that the instant removal of wavelengths corresponding to

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at least a portion of those wavelengths above the bandgap energy would inherently occur.

Instant claim 1 is even further removed from the Chen patents in that it requires a multijunction defined edge illumination receiving surface and an orientation equivalent to Brewster's angle. This type of orientation permits an improved photon absorption at the depletion layers (see page 5, lines 30-34, of the instant specification).

House et al shows a vertical multijunction solar cell and teaches a filter for sunlight, in the form of a colored plano-convex lens, to remove undesirable wavelengths (see Figure 1; and col. 8, lines 14-26). However, House et al does not lead a skilled artisan to the claimed primary and secondary concentrators (and Brewster angle). It is true that House et al teaches that, in addition to its colored plano-convex lens, a mirror arrangement can be used to provide or improve the desired concentration factor (see col. 11, lines 60-63). However, the optics in the Chen patents is more than just a mirror arrangement and includes lens(es). Indeed, Chen '551 and Chen '045 already have a lens (reference sign 20 in '045) above the solar cell (22). An additional lens as in House et al could create optical problems, particularly with respect to focusing, depending on the lenses. Chen et al '320 does not have such a lens (20), but all of the Chen patents use cooling flow to cool the solar cell. In essence, the Chen patents lead a skilled artisan away from the use of filters (i.e., additional optics which can be expensive) since the cooling in their devices is accomplished by cooling flow. A skilled artisan with House et al and the Chen patents before him/her simply would not use said colored plano-convex lens with the concentrating optics in any of said Chen patents.

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Winston (U.S. Patent 4,114,592) teaches a concentrator having lens (25) at the entrance (12) of its cylindrical reflector. However, note that the focal point (27) of the lens (25) is after said reflector. Instant claims 1 and 22 are distinguished from this since they require receiving light at the focal point.

Fraas et al (U.S. Patent 5,118,361) teaches a Fresnel lens (22) and a reflecting funnel (24). The reflecting funnel is not taught as one that is for homogenization of light, and Fraas et al actually teaches the minimization of reflection, i.e., teaches away from reflecting wavelengths, particularly in view of the fact that the GaSb used in its cell has a band edge at 1700 nm (see col. 4, lines 3-18).

The parabolic concentrating compartment (17) in Cobert (U.S. Patent 6,881,893) does not have an exit for the light. Rather, the solar cell (16) is at the bottom of the compartment.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
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A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.

Alan Diamond
February 22, 2006